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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/733,349

12/12/2003

Tatsuya Fukunaga

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02/10/2005

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EXAMINER

HAM, SEUNGSOOK

ART UNIT

PAPER NUMBER

2817

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/733,349

Applicant(s)

FUKUNAGA, TATSUYA

Examiner

Seungsook Ham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/22/04, 12/12/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1-3 and 9 are objected to because of the following informalities:

The claim should be drafted in a single sentence form. It should be noted that claims 1-3 and 9 recite the equations (A), (A-1) and (A-2) after a ".". These equations should be included before the ".". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 5-7, and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Saitoh et al. (US '918).

Saitoh et al. (figs 6A and 6B) discloses an RF module having a plurality of through holes 4 and satisfies $2.0r < d < 10r$ or $3.6r < d < 10r$ where d denotes an interval between centers of neighboring through holes (i.e., pitch) and r indicates a radius of each through hole ($d=0.4$ mm, $r=0.05$ mm, see fig. 6B and col. 5, lines 38-45).

Regarding claim 6, it is inherent that the smaller a center interval d respect to the radius r of each through hole increase electromagnetic field intensity higher since the smaller the interval d blocks more electromagnetic field leakage.

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The subject matter of claims 5 and 7 are shown in figure 6C.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 5-7, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Uchimura et al. (Development of a "Laminated Waveguide").

Uchimura et al. (fig. 1) discloses an RF module having a plurality of through holes and satisfies $2.0r < d < 10r$ or $3.6r < d < 10r$ where d denotes an interval between centers of neighboring through holes (i.e., pitch) and r indicates a radius of each through hole ($d=.26$ or $.52$ mm, $r=0.05$ mm, see TABLE II, and page 2440).

The subject matter of claim 5 is disclosed in page 2442.

Regarding claim 6, it is inherent that the smaller a center interval d respect to the radius r of each through hole increase electromagnetic field intensity higher since it is well known in the art that the smaller the interval d blocks more electromagnetic field leakage (see fig. 3. and page 2439, part III).

The subject matter of claim 7 is shown in figure 7.

Claims 1, 3, and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Takenoshita et al. (US 825).

Takenoshita et al. (fig. 1A) discloses an RF module having a plurality of through holes 3 and satisfies $2.0r < d < 10r$ or $3.6r < d < 10r$ where d denotes an interval between centers of neighboring through holes (i.e., pitch) and r indicates a radius of each through hole (see Examples 1-6).

Regarding claim 6, it is inherent that the smaller a center interval d respect to the radius r of each through hole increase electromagnetic field intensity higher since it is

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well known in the art that the smaller the interval d blocks more electromagnetic field leakage (see Examples 1-6 shows different pitch/interval d).

The subject matter of claims 5 and 7 are shown in figures 20-24.

Regarding claim 8, it is inherent from Takenoshita et al. that a gap g between through holes is greater than $\lambda/4$ since Takenoshita et al. teaches that the interval p is less than one half wavelength of a high frequency signal (col. 12, lines 1-9).

Claims 1, 3, 6 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Koivisto et al.(US '172).

Koivisto et al. (figs 6A and 6B) discloses an RF module having a plurality of through holes 19 and satisfies $2.0r < d < 10r$ or $3.6r < d < 10r$ where d denotes an interval between centers of neighboring through holes (i.e., pitch) and r indicates a radius of each through hole ($d=200-400\text{ }\mu\text{m}$, $r=100-200\text{ }\mu\text{m}$, see col. 3, lines 45-55).

Regarding claim 6, it is inherent that the smaller a center interval d respect to the radius r of each through hole increase electromagnetic field intensity higher since it is well known in the art that the smaller the interval d blocks more electromagnetic field leakage.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koivisto et al. (US '172).

Regarding claim 2, Koivisto et al. shows a resonator formed by a plurality of through holes (figs. 1a-1c). The conditional expression, $3.6r < d < 4.0r$ is considered as an obvious optimization since Koivisto et al. shows $d=4.0r$ (e.g., $d=400\text{ }\mu\text{m}$ and $r=50\text{ }\mu\text{m}$) and also suggested that d can be around $200\text{--}450\text{ }\mu\text{m}$ and $r=100\text{--}200\text{ }\mu\text{m}$, thus, one of ordinary skill in the art would optimize to obtain to meet the conditional expression $3.6r < d < 4.0r$ since Koivisto et al. give approximate interval/pitch range and radius.

Claims 4 and 5 are considered as an obvious modification to limit the amount of electromagnetic field leakage as one desires.

The frequency bandwidth range recited in claim 7 is obvious in view of Koivisto et al. since Koivisto et al. teaches that the resonator is operate in a high frequency such as MMIC.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al. (US '918), Uchimura et al. (Development of a "Laminated Waveguide") or Takenoshita et al. (US '825) in view of Delestre et al. (US '561).

Saitoh et al., Uchimura et al. and Takenoshita et al. do not teach that the through holes can form a resonator (note that the attenuation range is already disclosed by these references). However, using through holes to form a resonator is well known in the art. Delestre et al. (fig. 1) discloses a resonator formed by a plurality of through holes in a dielectric substrate.

It would have been obvious to one of ordinary skill in the art to form a resonator using a plurality of through holes in the device of Saitoh et al., Uchimura et al. or Takenoshita et al. since such design technique is well known in the art as shown by Delestre et al.

Claims 8, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al. (US '918), Uchimura et al. (Development of a "Laminated Waveguide"), or Koivisto et al. (US '172) in view of Jain et al. (US '805).

Saitoh et al., Uchimura et al., and Koivisto et al. do not show the gap g between the through holes are greater than $\lambda/4$. Jain et al. (fig. 9) shows an RF module having a plurality of through holes where the gap between through holes is in the range of $\lambda/2$ to $\lambda/4$ (col. 6, lines 65-67) to reduce inductance and improve isolation (e.g., electromagnetic field leakage, col. 2, lines 45-59).

It would have been obvious to one of ordinary skill in the art to provide a gap g between the through holes that is greater than $\lambda/4$ in the device of Saitoh et al., Uchimura et al., and Koivisto et al. to reduce inductance and to improve isolation as taught by Jain et al.

Claim Rejections - 35 USC § 102/103

Claims 10-12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Takenoshita et al. (US '825).

The method step recited in claim 10 is inherent from the device of Takenoshita et al. since the interval d and radius r of through holes must meet a certain range of attenuation to limit the amount of electromagnetic field leakage such that the device can

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operate properly, and also the structure of Takenoshita et al. is same as the applicant's claimed invention.

Alternately, obtaining the value for interval d or radius r of the through holes based on attenuation is considered as obvious optimization since it is well known in the art to set a desire attenuation so that one can limit the electromagnetic field leakage as one desires and it requires only a routine skill in the art.

Claim 10 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Saitoh et al. (US '918), Uchimura et al. (Development of a "Laminated Waveguide") or Koivisto et al. (US '172).

The method step recited in claim 10 is inherent from the device of Saitoh et al., Uchimura et al., or Koivisto et al. since the interval d and radius r of through holes must be meet a certain range of attenuation to limit the amount of electromagnetic field leakage such that the device can operate properly and also the structure of these references are same as the applicant's claimed invention.

Alternately, obtaining the value for interval d or radius r of the through holes based on attenuation is considered as obvious optimization since it is well known in the art to set a desire attenuation so that one can limit the electromagnetic field leakage as one desires and it requires only a routine skill in the art.

Information Disclosure Statement

The foreign patent documents, JP 04-220881 and JP 10-082184 will not be considered since these references are not relevant to this application. It appears that

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these references do not match with the English abstracts. The applicant provided the references based on the application numbers rather than the publication numbers (JP 11-2884409, JP 06-053711). Examiner requests proper references based on the English abstracts already submitted if the applicant desires to consider these references.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Uchimura et al. (US '256) discloses a RF module having a plurality of through holes where the spacing between adjacent via holes are less than $\frac{1}{2}$ of the signal wavelength λ_c ; and

Ishikawa et al. (US '342) discloses a dielectric resonator formed by a plurality of through holes.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seungsook Ham whose telephone number is (571) 272-2405. The examiner can normally be reached on Monday-Thursday, 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571)-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'SHAM', with a long horizontal line extending to the right.

Seungsook Ham
Primary Examiner
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